

Appl. No. 10/502,111

Attorney Docket No. 10555-091

I. Listing of Claims

1. (Original) An avalanche photodiode comprising:
an absorption layer disposed on a substrate layer;
a multiplication layer disposed on the substrate layer; and
a carbon-doped charge control layer disposed between the absorption layer and the multiplication layer.
2. (Original) The avalanche photodiode of claim 1 wherein the absorption layer is disposed between a first digital graded layer and a second digital graded layer.
3. (Original) The avalanche photodiode of claim 1 further comprising an n-type contact layer disposed between the multiplication layer and the substrate.
4. (Original) The avalanche photodiode of claim 1 further comprising a p-type contact layer.
5. (Original) The avalanche photodiode of claim 1 further comprising a buffer layer disposed between the n-type contact layer and the substrate.
6. (Original) The avalanche photodiode of claim 1 wherein the absorption layer is InGaAs.
7. (Original) The avalanche photodiode of claim 1 wherein the multiplication layer is InAlAs.

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8. (Original) The avalanche photodiode of claim 1 wherein the carbon-doped charge control layer is carbon-doped InAlAs.

9. (Original) The avalanche photodiode of claim 1 wherein the carbon-doped charge control layer is between 2 and 100 angstroms in thickness.

10. (Original) The avalanche photodiode of claim 1 wherein the carbon-doped charge control layer is between 5 and 50 angstroms in thickness.

11. (Original) The avalanche photodiode of claim 1 wherein the carbon-doped charge control layer is between 5 and 35 angstroms in thickness.

12. (Original) The avalanche photodiode of claim 2 wherein the first digital graded layer is InAlGaAs, and further wherein the second digital graded layer is InAlGaAs.

13. (Original) The avalanche photodiode of claim 3 wherein the n-type contact layer is one of InP or InAlAs.

14. (Original) The avalanche photodiode of claim 4 wherein the p-type contact layer is one of InP or InAlAs.

15. (Withdrawn) A method of fabricating an avalanche photodiode comprising the steps of:

- providing a substrate layer;
- depositing a multiplication layer;
- depositing a carbon-doped charge control layer; and
- depositing an absorption layer.

BRINKS
HOFFER
BILSON

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16. (Withdrawn) The method of claim 15 further comprising the step of depositing an n-type layer to collect electrons.

17. (Withdrawn) The method of claim 15 further comprising the step of depositing a p-type layer to collect holes.

18. (Withdrawn) The method of claim 15 further comprising the step of depositing a digital grading layer to prevent carrier trapping between bandgap offsets.

19. (Withdrawn) The method of claim 15 further comprising the step of doping an InAlAs material with carbon.

BRINKS
HOFFER
GILSON